

## Another First for the Wright Brothers

**W**e are approaching the 100th anniversary of the first powered flight. On December 17, 1903, near Kitty Hawk, North Carolina, Orville and Wilbur Wright alternately manned the controls of their airplane and made four powered flights. The amazing and wonderful story of the brothers, the plane, and the flight is well documented. However, the history of the 1903 Wright Flyer and its many components is rather checkered.

As the centennial approaches, we expect increasing questions about the authenticity of many objects related to the Wrights' first flight. The many values and uses of our collections are based on our understanding and knowledge of the objects in our trust. Establishing authenticity is therefore critical to our mission.

At Wright Brothers National Memorial at Kill Devil Hills, the museum displays a broken crankcase (catalog number WRBR-345) purported to be from the 1903 Wright Flyer. The park received the crankcase in 1960 from Orville Wright's estate. It appeared to be authentic. The fact that it was broken was significant because the brothers did record that following the fourth flight, a gust of wind toppled the Flyer and damaged the engine. The four legs cast into the crankcase to mount the engine to the airframe were broken off. However, based on a 1906 statement by Orville Wright, historians had assumed that the original crankcase had been destroyed.

The Smithsonian Institution in Washington, DC, had exhibited the 1903 Wright Flyer, including an engine, since 1948. When restoration of the

engine three. Over the years, parts were replaced, lost, damaged, and moved from one engine to another.

Questions remained following the Smithsonian's initial research. Knowing that the National Park Service had a Wright crankcase, the Smithsonian asked the Service to lend them the crankcase at Wright Brothers National Memorial. The Smithsonian staff needed to take measurements, examine the two crankcases alongside each other, and compare the crankcases with the Wright brothers' copious notes and drawings. Only by doing this could they determine the authenticity, dates of manufacture, and uses of the crankcases.

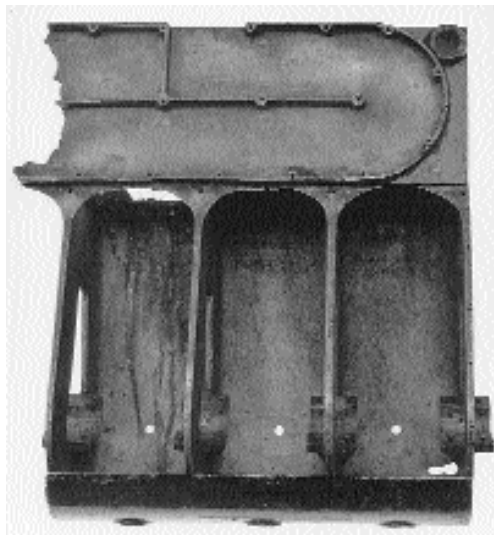
The questions and uncertainty were so great that simply examining and comparing the written records and the crankcases were not enough. The Smithsonian requested permission to "scientifically analyze the chemical composition and the precise color of the exterior crankcase paint ... and thread sealant deposited on the interior of the case." The analysis required the removal of minute samples of paint and sealant from inconspicuous places which are not visible when the crankcase is exhibited.

By summer 1985, the park staff was excited to hear from Rick Leyes that "... the evidence suggests that the broken crankcase was part of the original engine that made the first flight." (The fascinating and detailed story of the Smithsonian research is presented in Rick Leyes' article, "The 1903 Wright Flyer Engine: A Summary of Research" published in the *National Air and Space Museum Research Report*, 1986.)

Having identified the original first flight crankcase, the Smithsonian recommended additional study of the metal. The Smithsonian wanted to take samples to determine the metal's microstructure. With permission from the park superintendent, the Smithsonian staff took samples from three inconspicuous locations on the fractured surface of the crankcase. Martha Goodway, a metallurgist with the Smithsonian's Conservation Analytical Laboratory, using x-ray emission in a scanning electron microscope, determined that the metal was an aluminum-copper alloy as described in the Wrights' notes.

Beyond authentication of the crankcase, the scientific analysis and findings add to our knowledge of both aviation and metallurgic history. Ms. Goodway determined that, metallurgically, the crankcase had been precipitation-hardened. That

*Crankcase from the 1903 Wright Flyer on exhibit at Wright Brothers National Memorial, Kill Devil Hills, North Carolina. Photo courtesy The National Air and Space Museum, Smithsonian Institution.*



airplane began in 1985, National Air and Space Museum staff, led by Rick Leyes, began research to determine if the engine in the Smithsonian's Flyer was the original engine.

The Wrights cast engines in 1903, 1904, and 1905. In their typical methodical, no-nonsense style, they referred to the engines respectively as engine one, engine two, and

is meaningless to most of us, but here is how she explained it: "The precipitation hardening in the Wright Flyer's crankcase occurred earlier than the experiments of Wilm in 1909, when such hardening was first discovered, and predates the accepted first aerospace application of precipitation-hardened aluminum in 1910." (See Ms. Goodway's articles listed below.) Historically, the findings add another first for the Wright brothers. Powered flight required a power source. The Wrights knew they needed a metal engine which was strong but lightweight. Unable to use the heavy engines being manufactured for such uses as automobiles, they had an engine custom made at a foundry in Dayton, Ohio. They did not realize that the engine was precipitation-hardened. However, they were the first aviators to use precipitation-hardened aluminum-copper alloy. Today, more than 90 years later, it is a standard for the aerospace industry and is even used to make the space shuttle.

The loan of this museum object to the Smithsonian and their detailed historic and scientific analysis of it has helped both institutions and the public. We now know that the crankcase exhibited at the Wright Brothers National Memorial museum is the crankcase which powered the first flight. The interpretive and museum

staffs know a great deal more about the crankcase than we could ever have imagined. This knowledge adds to our awe and respect for the brothers' tenacity and ingenuity to accomplish what so many had attempted and failed: powered flight.

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#### References

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- Goodway, Martha, and Richard A. Leyes, "Back to Kitty Hawk: Investigating the First Aircraft Aluminum." *Journal of Metallurgy*, November 1993.
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## Jamestown Prepares for Quadricentennial in 2007

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Commemorations of historical events often are accompanied by what might be called "anniversary frenzy." Just before the celebration there is a belated outpouring of funds for hurried research and special events, sometimes with positive results and occasionally with results that are less than desired. At Colonial National Historical Park a different approach is being taken at Jamestown, Virginia. The town site already is preparing for the year 2007 to commemorate its founding as the first permanent English settlement in America 400 years ago.

In 1992, 15 years before the Jamestown quadricentennial, the National Park Service entered into a cooperative agreement with the Colonial Williamsburg Foundation and the College of William and Mary. Generally referred to as the Jamestown Archeological Assessment, it is a multi-disciplinary study of Jamestown Island's history, archeological record, and environmental reconstruction, plus a comprehensive survey of historic and prehistoric sites. It was determined from the project's inception that the park museum collection would play an integral role in the assessment.

A solid foundation was established for the assessment five years earlier. In 1987 special funds were provided by the Mid-Atlantic Regional Office to begin cataloging the backlog of more than 500,000 Jamestown artifacts. During subsequent years this commitment was extended when the Washington Office provided funding for the same purpose. By the time the assessment started, more than 50% of the collection was cataloged, and that figure approached 100% before the assessment was concluded. Without this special funding it would have been impossible to locate archival material and artifacts or provide data needed by research teams.

It was the Jamestown archives which provided information for the first major study. Coincidentally, this research started during the same year as the cataloging project, five years prior to the assessment's formal beginning. Historians and historical architects from Colonial Williamsburg joined with an anthropologist from William and Mary to re-examine Jamestown's archeological archives. Included were reports, field books, notes, photographs, maps, and drawings from preceding excavations during the years 1934-